MarCom WG 213

Design Guidelines for Marine Multipurpose Terminals

Terms of reference

1- Definition of the problem

Only a few documents about planning, design and management of multipurpose terminals are available now for the use of port planners, designers and operators of this kind of facilities. Existing ones are out of date due to dramatic changes experimented in technology, as well as vessels dimensions, cargo handling equipment, civil structure design and construction, etc.

PIANC has produced a set of guidelines oriented to the planning and design of specialist terminals including "Design Principles for Small and Medium Marine Container Terminals" (WG 135), "Guidelines for Cruise Terminals" (WG 152), "Recommendations for the Design and Assessment of Marine Oil and Petrochemical Terminals" (WG 153) and "Design of Small and Medium LNG terminals including bunkering facilities" (WG 172). At this time, others like "Design of terminals for RoRo and RoPax vessels" (WG 167) and "Design principles for Dry Bulk Marine Terminals" (WG 184) are under preparation. The present guidelines for planning and design of multipurpose terminals will aim to form part of the set mentioned before.

It is well known that the concept of a multipurpose terminal is "flexibility", word oriented to describe the possibility for the port facilities to deal with different kind of cargo, volumes, ships dimensions, cargo handling equipment and others, along its life span. In this case, "flexibility" could be perfectly associated with another word, "uncertainty", which will be present during the whole process of the project of the terminal, especially regarding structure design and construction.

Even in multipurpose terminals, designed for well-defined requirements in terms of cargo volumes, ships, etc. and their evolutions along time, there is an important degree of "uncertainty" due to the port business characteristics, which is very complex to evaluate in the very early step of the process of investment analysis.

Sometimes, especially in countries in transition, the decision to invest in the construction of a multipurpose terminal is coming from a national or local port authority, encouraged by the requirement of different users (multiusers) interested in handling small amount of diverse type of cargo (multipurpose). This scenario becomes more complex the problem of economically justify the investment, taking into account the difficult of cargo forecast analysis under these conditions.

2- Objective of the working group

The objective of the proposed Working Group (WG) is to gather existing technical documents, literature, codes and standards, and any other relevant information, analyze them, as well as research about new theories for the planning, design and calculation of multipurpose terminals, in order to produce an up-to-date technical report.

Such a manual can be of special interest to port planners, port authorities, National/Regional and/or Local Agencies, marine consultants and contractors, especially those involved in planning and design of this kind of terminals.

3- Documents to be reviewed

Current state of the art, including codes and standards (British Std., ROM, etc.); UNCTAD documents; guidelines and manuals; books; and research publications, should be reviewed. The main references include (but not be limited to) the following:

1978 UNCTAD – Port Development: A Handbook for Planning in Developing Countries.

1980 – Rafael Del Moral Carro, José María Berenguer Pérez – Planificación y Explotación de Puertos. Ingeniería Oceanográfica y de Costas (Tomo I).

1991 UNCTAD – Multipurpose port terminals. Recommendations for planning and management.

1997 Tsinker, G.- Handbook of Port and Harbor Engineering

2001 IAPH – Guidelines for planning and design

2014 Thoresen – Port designer's handbook

2014 PIANC Report No. 158 – Masterplans for the development of existing ports.

4-Scope

The WG will investigate all the parameters involved in the planning and design of this kind of terminals: location, design ships, water depth, cargo to be handled included hazardous ones (fundamentals of cargo forecast), handling equipment, storage facilities (open and close), environmental issues. Special attention should be paid to the possibility of handling in this terminal, small amount of dry bulk cargo, such as sand, fertilizers, etc., using a simple shore-ship/ship-shore storage and operation.

The WG will also address the adaptation of existing terminals (specialist or general) to new requirements under the multi-purpose operation concept.

Taking into consideration the idea of uncertainty explained in point **"1- Definition of the problem"**; the WG should propose a method of approaching to the cargo forecast, regarding planning and design techniques. Likewise, in order to consider changes of uses in the terminal along its life span, the WG will propose alternatives to take into consideration thiscircumstances ("flexibility concept").

Considering that this kind of terminals will be located in most of the cases in remote areas, which at the same time could be very susceptible to natural disasters, the WG will define also the way this kind of facilities could play a beneficious role under these type of emergencies.

The WG will need to address all of these issues and make recommendations, using examples from existing terminals where possible.

5- Intended product

The final product should provide practical guidance about planning and design of these terminals, containing case studies of terminals already in operation or under planning, design or construction stages.

6- Desirable background or experience of the working group members

The members of the WG should include:

- Port planners.
- Technical departments of specialist terminals (from both developed countries and countries in transition).
- Port Authorities and Governmental Organisations.
- Specialist marine terminal consultants and contractors.
- Representatives of other organizations as UNCTAD or ICHCA (International Cargo Handling Coordination Association).

7- Relevance for countries in transition

Increasingly, ports in countries in transition receive requirements for import and/or export of break bulk cargo, and in some cases dry bulk, in quantities not as important to justify the construction of specialist terminals (containers, ro-ro, break bulk, dry bulk, etc.).

There exist cases in which government authorities decide to carry out investments in a multipurpose terminal, offering the operation to private companies under the legal frame of a concession. In this case, the major problem for planning and basic design of the facilities is the lack of data (uncertainty?) regarding future requirements of the facilities such as type of cargo, storage, quantities, etc.

Likewise, in remote sites, it is often necessary to adapt existing port facilities to requirements derived from multi-purpose operation concept. In addition, in such a locations, where natural disasters could occur, this kind of facilities plays an important role at the time of design emergency plans and assistance to local people.

These guidelines should result in a useful guide that takes into consideration the parameters of uncertainty, proposing a design approach under the concept of flexibility in order to plan and design the different terminal elements such as storage areas, equipment, gates, inland connections, etc.

8- Climate Change

The WG should consider the potential consequences of climate change in the design and operation of the terminal, for example, sea level rise and increased storminess, affecting wave heights, currents and seabed steadiness.